

WHAT IS CLAIMED:

1. In a transfer device usable in a system for intraluminal treatment of a selected site in a body of a patient by at least one treating element advanced through a lumen in the transfer device into a lumen of a separate catheter by means of pressurized fluid, the transfer device and the catheter defining a fluid path for pressurized fluid, the transfer device further comprising an integral pump for pressurizing and circulating the fluid through the fluid path and a removable fluid cartridge including a reservoir from which fluid is drawn by the pump and to which fluid is returned after being circulated through the fluid path.

2. The transfer device of Claim 1 wherein the integral pump comprises a peristaltic pump.

3. The transfer device of Claim 1 wherein the integral pump comprises a reversible peristaltic pump.

4. The transfer device of Claim 1 wherein the fluid cartridge includes an elongated fluid pick-up having an inlet through which fluid is introduced into the transfer device and sized in length so that the inlet is always submerged in fluid regardless of the orientation of the transfer device.

5. The transfer device of Claim 1 further comprising a removable cartridge including a storage sleeve for housing the treating element, the sleeve having a lumen forming part of the fluid path.

6. The transfer device of Claim 5 wherein the

storage sleeve comprises a radiation-blocking material.

7. The transfer device of Claim 6 wherein the radiation blocking material comprises quartz.

8. The transfer device of Claim 5 wherein the  
5 removable cartridge further comprises a memory for storing and indicating selected information about the treating element.

9. The transfer device of Claim 1 further comprising an external access point to the fluid path  
10 adapted to receive an external source of pressurized fluid.

10. In a transfer device usable in a system for intraluminal treatment of a selected site in a body of a patient by at least one treating element advanced through  
15 a lumen in the transfer device into a lumen of a separate catheter by means of pressurized fluid, the transfer device and catheter defining a fluid path for pressurized fluid, the transfer device being adapted to receive a fluid cartridge for holding the fluid and a source  
20 cartridge for storing the treating element, a system for preventing operation of the transfer device unless each of the catheter, fluid cartridge and source cartridge are attached thereto comprising:

an illumination source and optical sensor  
25 located in the transfer device in proximity to where each of the catheter, fluid cartridge and source cartridge is received by the transfer device, each illumination source being located with respect to

its optical sensor so that the optical sensor is able to receive light from its illumination source only if the catheter, fluid cartridge or source cartridge is not received by the transfer device, and the optical sensor being blocked from receiving light from the illumination source when the catheter, fluid cartridge or source cartridge are received by the transfer device;

a microprocessor for controlling the movement of the treating element from the transfer device to the catheter, the microprocessor preventing operation of the transfer device upon receiving a signal from any of the optical sensors indicating that at least one of the catheter, fluid cartridge and source cartridge is not attached to the transfer device.

11. The transfer device of Claim 10 further comprising a graphical user interface controlled by the microprocessor for visually indicating which of one or more of the catheter, fluid cartridge and source cartridge is not attached to the catheter when operation of the transfer device is prevented.

12. A catheter having a proximal end and a distal end for use in a intraluminal treatment system wherein a treating element is advanced from the proximal end of the catheter to the distal end by means of pressurized fluid, the catheter comprising:

first, second, third and fourth lumens

extending substantially from the proximal end to the distal end of the catheter, the first lumen being sized to slidably receive the treating element but to prevent the treating element from exiting the first lumen at the distal end of the catheter, the first lumen being in fluid communication with the second and third lumens at the distal end thereof, and the fourth lumen being open at the distal end and sized to receive a guidewire.

13. The catheter of Claim 12 wherein the fourth lumen includes a protective liner.

14. The catheter of Claim 14 wherein the protective liner is polyimide.

15. The catheter of Claim 12 wherein the proximal and distal ends of the catheter are of different stiffness and flexibility, and the distal end has a cross-sectional area smaller than the proximal end of the catheter and a non-circular cross-sectional shape so as to permit perfusion.

16. The catheter of Claim 15 wherein the proximal end is fused to the distal end.

17. The catheter of Claim 15 wherein the proximal end and distal end are formed through a single variable extrusion.

18. In a transfer device usable in a system for intraluminal treatment of a selected site in a body of a patient by at least one treating element advanced through a lumen in the transfer device into a lumen of a separate

catheter by means of pressurized fluid, the transfer device and catheter defining a fluid path for pressurized fluid and a treating element residing in a cartridge removably received by the transfer device, the transfer  
5 device further comprising:

a gate moveable between first and second positions to selectively permit or prevent the treating element from moving from the treating element cartridge to the catheter;

10 a first release button to permit disassembly of the catheter from the transfer device upon manipulation of the first button;

a second release button to permit the treating element cartridge to be separated from the transfer  
15 device upon manipulation of the second button;

an actuator assembly to control the gate and to permit manipulation of the first and second release buttons only when the actuator assembly controls the gate to prevent the treating element from moving  
20 from the treating element cartridge to the catheter.

19. The transfer device of Claim 18 wherein the actuator assembly comprises:

a worm gear;

a drive motor for rotating the worm gear;

25 a mounting member secured to the worm gear that moves linearly between first and second positions upon rotation of the worm gear;

a plate secured to the mounting member for

engaging the gate and moving with the mounting member to move the gate between its first and second positions;

5 a post secured to the mounting member and moveable therewith to a position to prevent manipulation of the first release button when the plate moves the gate to its first position; and a rod secured to the mounting member and moveable therewith to a position to prevent manipulation of  
10 the second release button when the plate moves the gate to its first position.

20. In a transfer device usable in a system for intraluminal treatment of a selected site in a body of a patient by at least one treating element advanced from a  
15 translucent storage sleeve having a lumen into a lumen of a separate catheter by means of pressurized fluid, a system for detecting the presence or absence of the treating element in the translucent storage sleeve comprising;

20 a light source including a jacketed fiber optic bundle disposed on a first side of the storage sleeve to produce a plane of light that intersects at least a portion of the storage sleeve lumen;

a linear array of photosensors disposed on a  
25 second side of the storage sleeve so as to measure light from the light source;

a microprocessor for comparing the amount of light measured by the photosensors to a reference

amount corresponding to the amount of light measured by the photosensors when the treating element is not within the lumen of the storage sleeve.

21. The transfer device of Claim 20 wherein the  
5 light source comprises an infrared light source.

22. The transfer device of Claim 20 wherein the light source comprises a laser diode.

23. In a transfer device usable in a system for intraluminal treatment of a selected site in a body of a  
10 patient by at least one treating element advanced through a lumen in the transfer device into a lumen of a separate catheter by means of pressurized fluid, the transfer device and catheter defining a fluid path for pressurized fluid, the transfer device being adapted to receive a  
15 fluid cartridge for holding the fluid and a source cartridge for storing the treating element, a system for preventing operation of the transfer device unless each of the catheter, fluid cartridge and source cartridge are attached thereto comprising:

20 a sensor located in the transfer device in proximity to where each of the catheter, fluid cartridge and source cartridge is received by the transfer device, each sensor generating a signal based on whether each of the catheter, fluid  
25 cartridge or source cartridge is received by the transfer device;

a microprocessor for controlling the movement of the treating element from the transfer device to

the catheter, the microprocessor preventing  
operation of the transfer device upon receiving a  
signal from any of the sensors indicating that at  
least one of the catheter, fluid cartridge and  
5 source cartridge is not attached to the transfer  
device.